



On-Road Vehicle Battery Chargers

October 11, 2010

California Energy Commission, Staff Workshop

Docket No. 09-AAER-2; RE: 2010 Rulemaking proceedings
Phase II on Appliance Efficiency Regulations

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Overview

- **Society of Automotive Engineers (“SAE”) has taken the lead on developing power quality and charger efficiency requirements for vehicles:**
 - **SAE J2894 “Power Quality Requirements for Electric Vehicle Chargers”**
- **SAE J2894 is composed of two documents**
 - **Part 1: Charger PQ & Efficiency Parameters -- sets the value of the various parameters**
 - **Part 2: Testing Methods -- testing means for verification of the parameters in Part 1**

Background – Early EV Standards

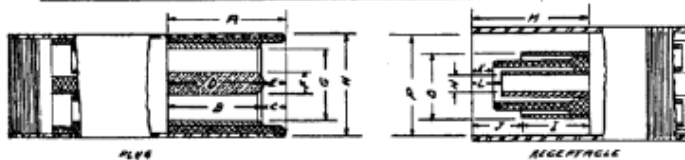
Connector Standards- 1913

Electric Vehicle Association of America



124 W. 42ND ST.
NEW YORK

Standard Charging Plugs and Receptacles



Contacts must be accurately concentric to insure interchangeability.¹⁰¹

CAPACITY	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
50 AMP	1 1/4	1 1/2	3/8	1 1/2	1/8	1/32	1/16	1/2	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8
150 AMP	2 1/4	1 1/2	1/8	2 1/4	1/8	1/32	1/16	1/2	1/8	1/8	1/8	1/8	1/8	1/8	1/8	1/8

* The National Board of Fire Underwriters have approved plugs of the above dimensions for these ratings with an allowable overload of 50%.

Polarity— Outside contact positive, inside contact negative.

Terminals— Should be large enough to receive cable having a rating, according to the Underwriters Code Table B, at least equal to the normal rating of plug.

Terminals are to be marked + and - to correspond to polarity of contacts as above.

COMMITTEE ON STANDARDS
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Louis Burr

Oct 10th 1913

Recommended by Standardization Committee and accepted by E.V.A.A. Oct 1912 and Oct 1913.

The electric vehicle - raising the standards



Figure 3.25: 150 A charging plug with handle¹⁰¹

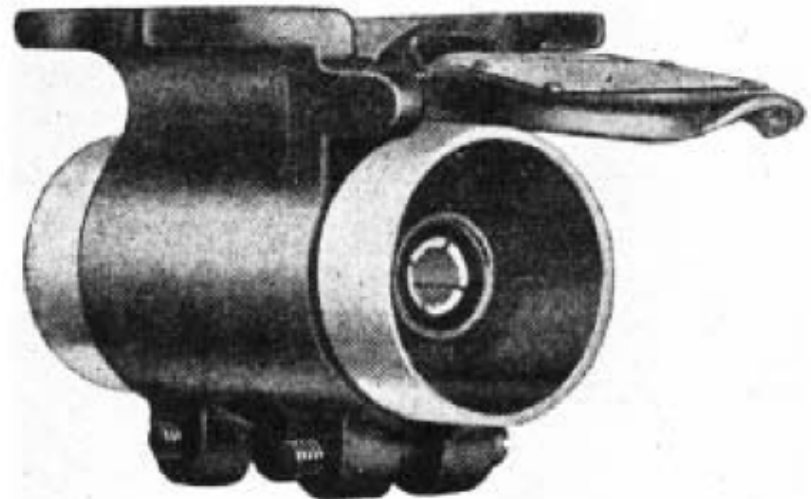


Figure 3.26: 150 ampere-hour (sic) charging receptacle¹⁰²

Background

- In April 2009 the Society of Automotive Engineers (SAE) Hybrid Committee approved the recommendation to create an SAE document to capture power quality **and charger efficiency requirements**
- The SAE Power Quality Task Forces is lead by Gery Kissel (GM) and Jose Salazar (SCE)
- SAE document could be referenced by either state or federal governments as vehicle requirements (ANSI consensus standard)
- Document to cover on-board and off-board chargers for all types of batteries
- Listed by NIST as a reference standard for the Smart Grid
- Ongoing discussion of which agency to adopt and enforce the standard

Charger Power Quality Parameters

Parameter	SAE	EPRI
Power Factor	95%	95%
Power Transfer Eff.	90%	85%
%ITHD	10%	20%
Inrush Current	120% Nominal Max.	Specific Value

Efficiency Measurement

- Power Transfer Efficiency – Instantaneous
- On-road battery chargers do more than just charge the vehicle's batteries:
 - Battery cooling
 - Cabin cooling
 - Etc.
- Work is underway to better characterize charger energy use to develop more robust efficiency regulations that include all aspects of the charging cycle

Status

- SAE J2894 Part 1 is currently in ballot
- SAE J2894 Part 1 is expected to be officially released to the public in November 2010
- SAE J2894 Part 2 is expected to begin in early 2011 with completion for late 2011

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Questions?

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